

When Deer Are Too Dear and Elk Are Too Elegant

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Wild ungulates—deer and elk in particular—are charismatic animals and valued natural resources. I've had the opportunity to work with these animals across much of North America in various capacities: defining their relations with forestry practices, assessing the possible impacts of energy development, defining criteria to improve transplant success, following radio-collared individuals over hill and dale, and even participating in a few hunts. But mostly, I've dealt with problem aspects stemming from overabundant populations of deer and elk. I'd like to reflect on what I have learned from these situations. My comments are largely my own and should not be interpreted as representative of any particular state or federal agency or other organization. While I am focusing on deer and elk, many of these comments apply to some populations of other wild, feral, or introduced ungulates.

Deer and elk were initially very widespread across the continent, but occurred at relatively low densities. It has been estimated that, historically, there were about 10 deer per square mile over much of North America. Those densities were probably the result of harvest by Native Americans, predation by a diverse and relatively abundant predator fauna, and importantly, heavy forest canopy cover that precluded lush understory development (hence, limiting food for ungulates).

With increasing settlement of North America, all that changed. Unregulated market hunting and increasing subsistence needs greatly reduced herds, both in density and range. Deer and elk were actually extirpated in many states.

This trend was soon to be reversed as a result of a combination of factors. Forest cover was being removed to provide for crops and livestock grazing. At the same time, large carnivore populations were being greatly reduced for human safety and livestock protection.

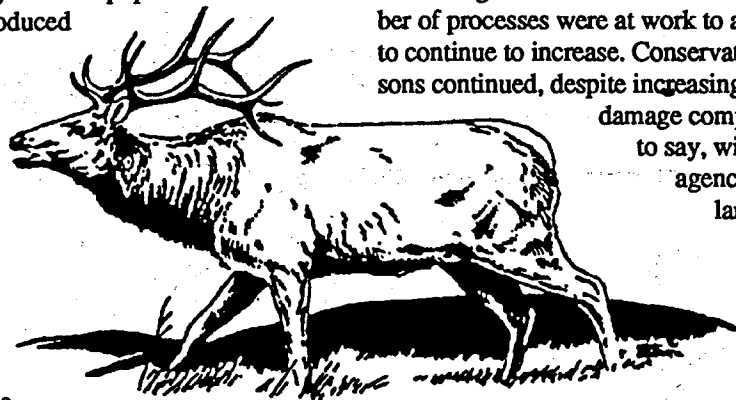
Meanwhile, persons in the various states were realizing what a valuable resource they had lost and

protective measures were enacted. Deer and elk hunting seasons were closed. Deer and elk were trapped from areas of relative abundance (such as Yellowstone) and transplanted widely across the U.S. When the seasons were finally opened again, bulls-only and bucks-only harvest strategies were commonly used to protect the reproductive potential of the growing populations. Thus, the populations were protected, or conservatively harvested, at the same time that habitat conditions (forage production, in particular) were rapidly improving and predation rates had fallen to very low levels. Needless to say, ungulate populations responded by reclaiming most of their former range and achieving moderate densities (as high as, or somewhat higher than, historic levels).

Things could have stabilized there, but a number of processes were at work to allow populations to continue to increase. Conservative harvest seasons continued, despite increasing populations and damage complaints. Needless to say, with state wildlife agencies obtaining a large portion of their revenues from hunting license sales, there was (and still is!) a large incentive to

keep population densities high. Supplemental winter feeding became common in many areas both by state agencies, but also by a growing number of private sector parties. This was usually done because winter range was considered limiting to the ungulate population, or as a response to—or in anticipation of—a series of harsh winters. Predator control continued, and was justified in an increasing number of areas, expressedly to protect "important" game populations.

At the same time, deer and elk had become "featured species" for many public land management agencies, meaning that land management decisions had to result in equal or improved conditions for those species. The private sector contributed to this concept in its own way: more and more areas of good ungulate habitat (a mix of



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agricultural and forest lands) were put off limits to hunting by choice of the landowner. Additionally, extensive urban/suburban sprawl precluded large areas from hunting entirely, or resulted in reduced harvests because of reduced season lengths and/or weapon restrictions. This situation has been exacerbated in recent years by the declining number of hunters and growing anti-hunting sentiment.

As might have been anticipated, ungulates—being creatures of habit and habitat, being reasonably long-lived, and having moderately high reproductive potential—certainly took advantage of this situation. Densities of deer are averaging 20 per square mile (twice the historic densities) and have been documented at much higher densities in many areas—over 200 per square mile in some places! Elk numbers nationwide are probably at an all-time high with densities of 15 per square mile reported for many areas. I note, however, that elk are not only difficult to census, but tend to congregate in preferred areas, and hence are usually not as evenly dispersed as deer. Much evidence suggests that deer and elk populations are doing very well in many parts of the country: high and sustained harvest rates, high numbers of damage complaints, high numbers of animal-vehicle collisions, increasing demand for damage relief (repellents, barriers), and increasing disease concerns. There may be other ancillary evidence that is not so well documented: greater use of forested areas by elk than historically occurred and more year-round use of areas by deer and elk that, historically, were only used seasonally by migratory animals. This situation applies to other species of wild, feral, or introduced ungulates in some cases, but over much more restricted geographic areas. Of course, the situation that I have described does not apply to all deer, elk, or other ungulate populations. There are some endangered subspecies of white-tailed deer; woodland caribou are endangered; and some populations of mule deer have undergone long-term declines.

The problems from overabundant ungulate populations persist and may be increasing. We, as resource managers and wildlife damage management professionals, are entrusted to deal with, or resolve, these conflicts. There are many types of problems that occur: crop damage (alfalfa, corn, soybeans), tree damage (orchards, Christmas trees, reforestation), rangeland damage (forage competition, fence damage, riparian habitat degradation, haystack raiding), disease transfer (to livestock, other wildlife, and occasionally humans), vehicle strikes (resulting in damage, injuries, deaths, and increased insurance costs), and urban/suburban damage (gardens, ornamentals).

There is another type of damage, however, that has received less attention: impacts to biodiversity. It is becoming increasingly clear that overabundant ungulate populations can and do affect ecosystem composition and function. Biodi-

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versity and ecosystem health have become preeminent concerns for resource managers in recent years.

Concerns with wild ungulate effects on ecosystems were perhaps first raised in the eastern and north central U.S., where certain common tree species (oaks, eastern hemlock) were not regenerating, presumably because of white-tailed deer browsing. Also, it appeared that some understory, herbaceous species (lilies, orchids) were disappearing from large areas because of their high palatability to ungulates. Impacts on bird populations, probably because of the loss of the shrub layer, were also documented. The impacts on small mammals were less noticeable, perhaps because the decline in some species was counterbalanced by increases in other species. It has become clear that white-tailed deer function as a "keystone" species in these ecosystems.

In the western U.S., there has been less documentation of wild ungulate impacts on ecosystems. The emphasis in this region has been on domestic livestock impacts, which have been shown on vegetation, bird populations, and soil properties. When you look at long-term ungulate exclosures (unfortunately, there are few of these that are of any size or that have been maintained for many decades), one can surmise that what we consider to be "normal, natural vegetation" may be an artifact of long-term grazing by high densities of ungulates.

This can be seen in the Olympic Peninsula of Washington and perhaps in a few other areas. We looked at exclosures in northeastern Oregon that had not been in place very long (5-15 years), but were of reasonable size (50-100 acres). The area was grazed by cattle and supported a wintering herd of over 1,500 elk. We found reduced shrub cover, shrub species richness, and shrub diversity as well as reduced organic litter on grazed areas. This is consistent with published results from other studies. Bird use of the exclosures was not different than use of the grazed areas, but birds are fairly mobile and the exclosures may not have been large enough or in place long enough to show a response. There were substantially reduced small mammal numbers on the grazed areas and we did not capture shrews on those areas. Shrews are primarily insectivorous and represent secondary consumers in the ecosystem. It is possible that the reduction in small mammals (potential prey for shrews) and perhaps in insects (not monitored in this study) resulted in the loss of a trophic-level in the ecosystem. Our results may have been more dramatic, except that this is a dry area and has had a long history of overgrazing by livestock; consequently, the area (including the exclosures) had probably not recovered from past land use practices.

Where does all this leave us? It appears certain that overabundant ungulate populations can have substantial impacts on ecosystems. One must consider, however, that wild ungulates are a valued resource across most of North America. A balance must be struck between ungulate population densities and the resultant conflicts with human interests and other re-

sources. As the human population increases and expands into uninhabited lands, these conflicts can be expected to become more common and intense. These conflicts will remain controversial and difficult to resolve. Consider the attitude of many hunters and non-hunters alike: the more deer (or elk) that you see, the better the experience!

There are a number of obstacles that hinder our attempts to resolve these conflicts. There are fewer hunters, yet hunters (and agencies?) want to see higher harvest success rates and rates that are maintained at high levels over time. There are many fewer acres open to public hunting and anti-hunting sentiment seems to be growing each year. Areas closed to hunting serve as refugia and make it difficult to achieve adequate harvests and population regulation on surrounding lands. Furthermore, the casual observer is not very sensitive to the impacts of overabundant ungulate populations on the flora because, in most cases, the area remains "green and vegetated" as a result of increases in abundance of unpalatable or invasive plant species. Most of the methods that we have available to reduce the impacts of ungulate grazing are small-scale approaches (tree guards, repellents, use of less palatable plant species, fencing) that do not help with a landscape- or ecosystem-level problem. New methods are needed that can be applied over large areas analogous to the aerial delivery of oral baits to vaccinate free-ranging carnivores for rabies control. Research is under way to develop contraceptive technology that could be used in a similar way. Indicator species—in particular, herbaceous species and secondarily, invertebrate or vertebrate species—that could be used to monitor overgrazing impacts have not been identified for most regions. And yet we need to know if ecosystem-level impacts have occurred or are occurring. Finally, the funds available to state wildlife agencies to monitor ecosystem-level impacts—and non-game elements of ecosystems in general—have been inadequate to address this problem. A large and reliable source of funding for the "Teaming With Wildlife" initiative could help remedy this funding problem.

Wild ungulates are, and will continue to be, an important natural resource in the U.S. At the same time, their management is, and will continue to be, controversial and difficult. If we want to protect all resources and reduce conflicts, we may need to maintain wild ungulate densities at much lower levels than those to which we have become accustomed. The future management of these valued resources depends on the development of new approaches and methods and the combined efforts of all of us!



The Editor thanks the following contributors to this issue: Gary W. Witmer, Augustine U. Ezealor, Jeff Jackson and, Bob Giles, Jr. Send your contributions to The PROBE, 4070 University Road, Hopland, CA 95449.